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Annual Progress Report for the

Bioresponse Monitoring of Peoria Lake

Habitat Rehabilitation and Enhancement Project (HREP)

February 1999

Kevin S. Irons and Timothy M. O'Hara

Illinois Natural History Survey

Long Term Resource Monitoring Program

For

U.S. Army Corps of Engineers, Rock Island District

Center for Aquatic Ecology

Aquatic Ecology Technical Report 99/1

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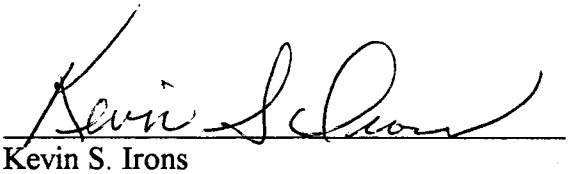

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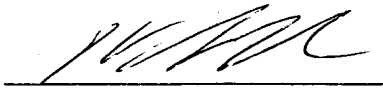
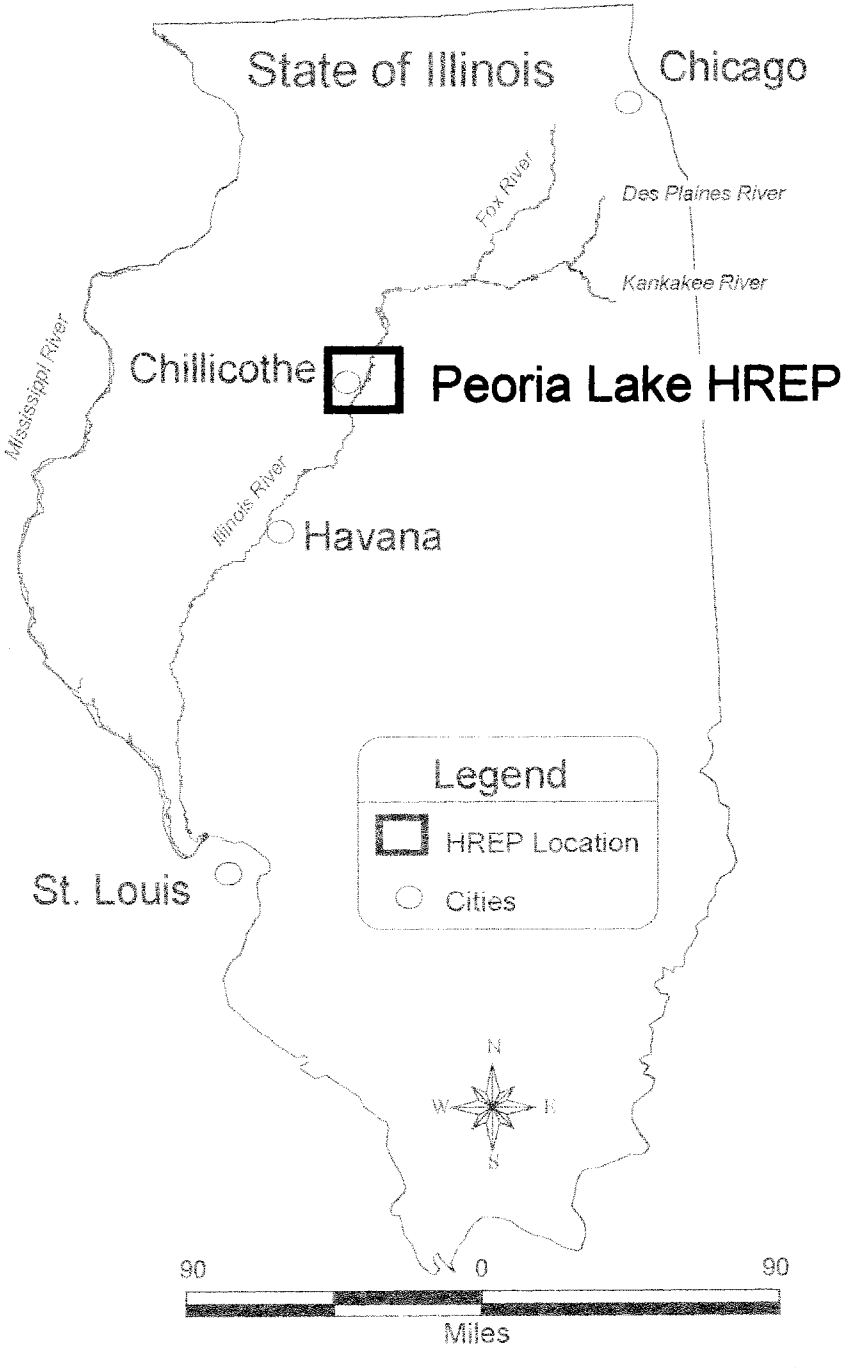


Dr. Dan Soluk, Director
Center for Aquatic Ecology
Illinois Natural History Survey

Figure 1. State of Illinois showing Illinois River and location of HREP bioresponse monitoring site.



Introduction

This report summarizes fish data collected in 1997 for bioresponse monitoring at the Peoria Lake Habitat Rehabilitation and Enhancement Project (HREP). This is a continuation of monitoring during 1991 and 1992 that provided baseline data on fish populations and communities at the Peoria Lake HREP prior to construction. Some preliminary comparisons of the 1997 data are made with the 1991-92 pre-construction HREP data to begin to assess the possible responses of fish populations to the project. Data were collected by staff at the Illinois Natural History Survey (INHS) Long Term Resource Monitoring Program (LTRMP) Field Station at Havana, Illinois. Funding for this work was provided by the Rock Island District of the U.S. Army Corps of Engineers (USACOE).

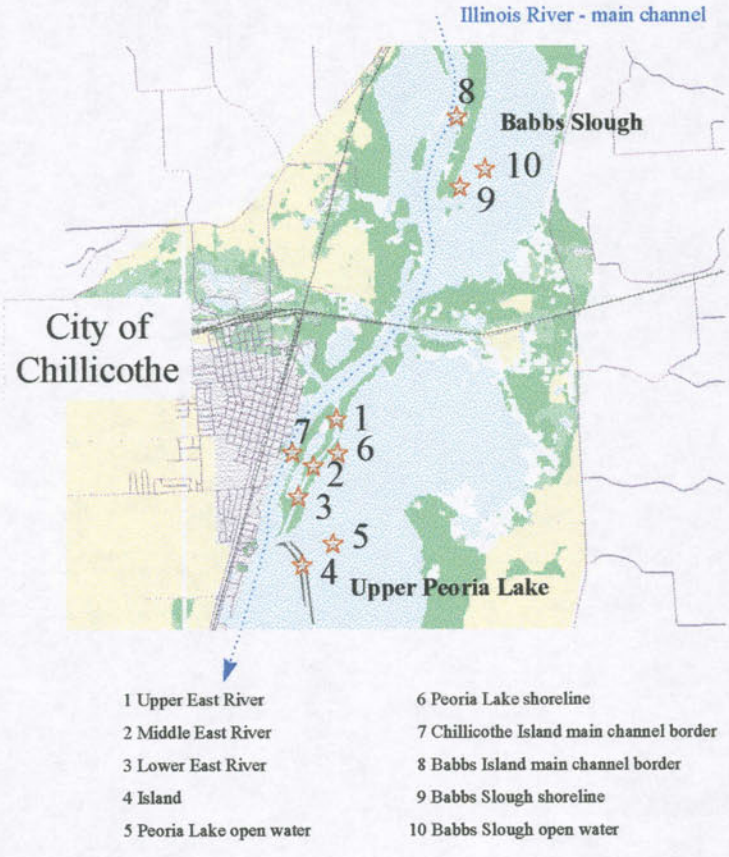
Methods

Site Descriptions

Monitoring of fish communities before (pre-construction, 1991-92) implementation of the Peoria Lake HREP (Figure 1) began with establishing and sampling at fixed sites (numbered 1-2, 5-10 in Figure 2, Dept. of the Army 1991, Harvey 1992, Irons and Blodgett 1993, Blodgett et al. 1994). The HREP consisted of 3 main parts: 1) reopening the lower end of the East River which became plugged in the mid 1960s, thus increasing the side channel habitat in the study area, 2) construction of a barrier island across Upper Peoria Lake to reduce wind generated waves, reducing resuspension of sediments and increasing depth, and 3) construction of a Forested Wetland Management Area (FWMA; Department of the Army 1991). These fixed monitoring sites were chosen to act as experimental and control sites. In 1991-92 the experimental sites were those in the vicinity of the HREP project, numbered 1, 2, and 5-7 in Figure 2, that may see the most impact of the project. The control sites were sites located in similar habitat types, sites 8, 9, and 10 in Figure 2, that should not be affected by the project and may help in determining year to year changes in the fish populations due to other environmental conditions acting independent of the HREP project.

During pre-construction the five experimental sites include the upper East River (1), middle East River (2), Peoria Lake open water (5), Peoria Lake shoreline (6), and Chillicothe Island main channel border (7). The three control sites roughly 3 miles upstream from the project area include Babbs Island main channel border (8), Babbs Slough shoreline

Figure 2. Peoria Lake HREP sampling sites.



(9), and Babbs Slough open water (10). Because of the lack of side channel habitat in this reach of the river, there was not a control site with characteristics of the East River.

During 1997 the same sites (utilized in 1991-92) were sampled along with two additional sites in areas created by construction: the lower East River site (3) is in the newly created side channel and the Island site (4) is located between the newly constructed barrier island and the dredge spoil island that is smaller and parallel to the barrier island (Figure 2). The lower East River site can be characterized as side channel habitat; it is within a dredged out portion of the East River that had previously been obstructed by debris, silted in, and eventually became terrestrial. Since construction, this site maintains flow, good water depths, and some brush piles that often characterize side channels. The new Island site also functions as side channel habitat with flow throughout the sampling area. In the fall of 1997 a rock closing structure was constructed at the upstream end of the channel between the islands. This was intended to limit some flow through the channel between the new barrier Island and dredge spoil island and direct more current and sediments back into the main channel. All together, we sampled 10 sites from four sampling periods during 1997. Locations for each site were collected and recorded during 1997 using a Gamin 75 Global Positioning System (GPS) unit using UTM's (Universal Transverse Mercator).

Sampling Descriptions and Effort

Fish sampling methods in 1997 are comparable to those used in the 1991-92 sampling and the LTRMP sampling protocols (Lubinski and Rasmussen, 1988) that were adopted for this project. The updated LTRMP protocols are documented in the LTRMP Procedures Manual, Fish Monitoring Section (Gutreuter et. al., 1995). These new protocols are followed with noted exceptions to ensure consistency between years. Sites were sampled throughout four of the six HREP sampling periods (2 - 5) during 1997. Each period sampled during 1997 was 45 days long (Table 1).

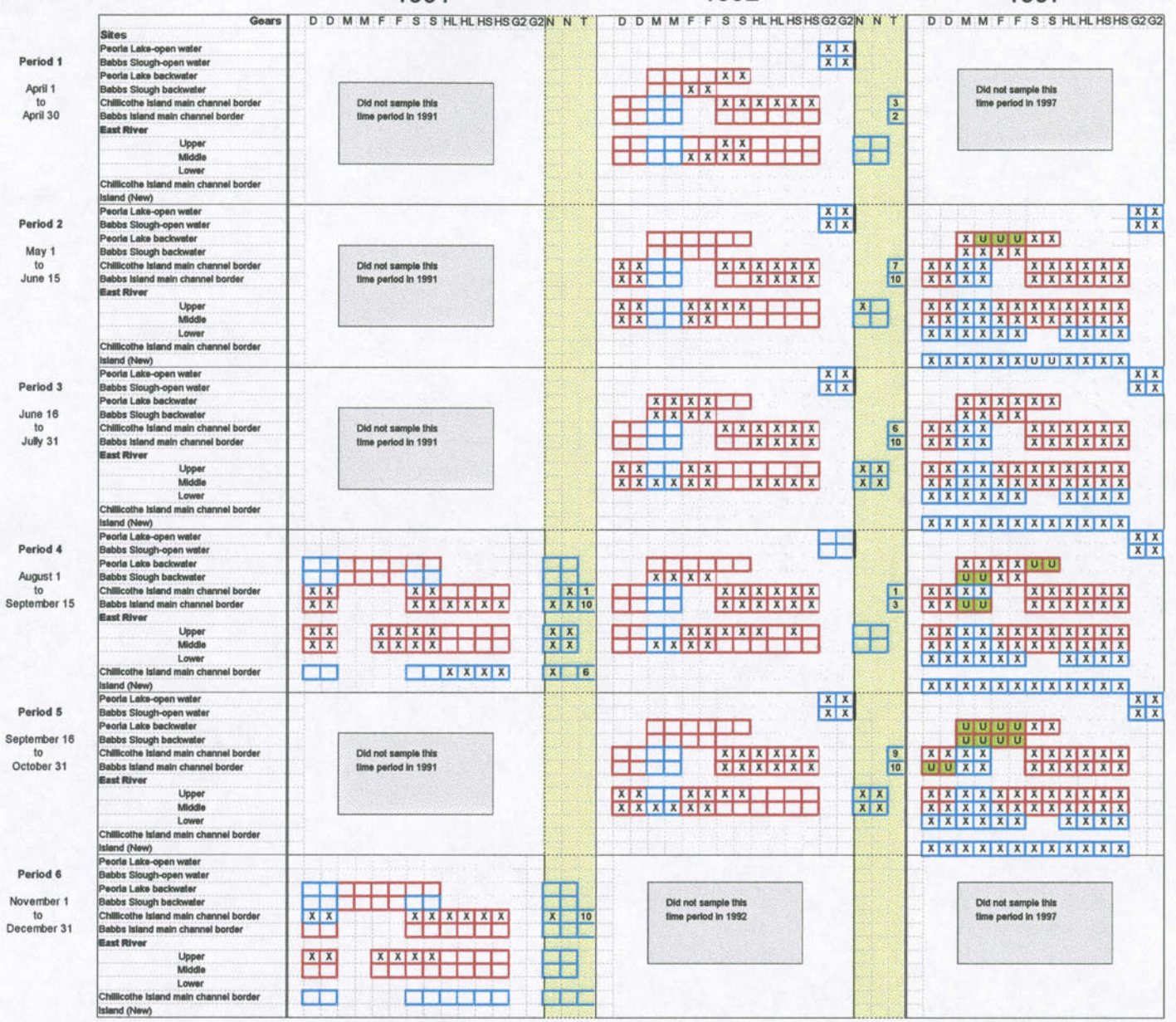
In 1997, there were only slight modifications in effort as compared to sampling during 1991-92 (Figure 3). Night electrofishing and trawling was not utilized in 1997 primarily for safety and scheduling reasons. Also, minnow fyke net sets and seines were fished at all sites except for the Babbs Slough shoreline site where sediments were too flocculent to seine efficiently. Hoop nets utilized in 1997 were fished in tandem (bridled) as in 1991-92 sampling for consistency although LTRMP protocols have changed to a side by side implementation of small and large hoop nets. The seining effort for each site was doubled, four hauls per site in 1997 (two per replicate) instead of two (one per replicate) as in 1991-92.

Table 1. Sampling periods for HREP bioresponse monitoring of Peoria Lake.

HREP time periods	Inclusive dates
1 (not sampled in 1997)	1 April to 30 April
2	1 May to 15 June
3	16 June to 31 July
4	1 August to 15 September
5	16 September to 31 October
6 (not sampled in 1997)	1 November to 31 December

During each sampling period, the two main channel sites at Chillicothe Island and Babbs Island (Figure 2) were sampled with the following gears: two daytime electrofishing runs, two tandem hoop net

Figure 3. Summary of gear deployment per sampling window at Peoria Lake HREP sites for all years and time periods, (1991, 1992, and 1997).



sets, two minnow fyke nets, and four seine hauls. The four side channel sites, three in the East River and the Island site, were sampled with the following gears: two daytime electrofishing runs, two tandem hoop net sets, two fyke nets, two minnow fyke nets, and four seine hauls. Babbs Slough and Peoria Lake shoreline sites were fished with the following gears: two daytime electofishing runs, two fyke net sets, and two minnow fyke net sets. There were four seine hauls at Peoria Lake per time period and none at Babbs Slough. Two gill nets were set at both Peoria Lake and Babbs Slough open-water sites.

Each site was designed to have two replicate samples taken for each sampling period. At each of the sites each gear was fished with duplicate effort. This duplicated effort (replicate) is combined to describe that particular site. Physically a site is 450 m long, outlined by two 200 m stretches of shoreline (for electrofishing runs) separated by 50 m of shoreline. At each site, half of the total effort per time period is within each of the 200 m stretches. For example, at each site two fyke nets are fished per time period. One net is set in the upstream 200 m section or replicate one, the second net is set in the downstream 200 m section or replicate two. These pseudo replicate samples (e.g., two hoop net sets) that were fished simultaneously and recorded independently were pooled together to describe an individual site for this report.

Overall, effort has been somewhat variable over the three years of sampling at the Peoria Lake HREP. During 1991 much of the effort was focused on the experimental sites with only Babbs Island main channel being sampled as a control. Also, in 1991 the main channel site at Chillicothe Island was upstream a tenth of a mile than where the subsequent years site was sampled. The control sites were all sampled in 1992. The most complete sampling year, also with the most effort was 1997 (Figure 3).

We classified the relative success of collections by assigning a report code of 1-7 for each collection as specified by LTRMP protocols (Lubinski and Rasmussen 1988, Gutreuter 1995). Those collections with summary codes of 1 or 2 represent net sets or electrofishing that did not meet LTRMP requirements; for example, the net was not set due to low or lack of water, the net flipped, a hole was discovered in net when lifted, or the net was stolen. Only gears that fished successfully (IE. summary codes > 2) were included in this report.

The LTRMP fish component also began identifying turtles in 1993 and we continued at this HREP site. Turtle species, gender, and carapace length were recorded and included in the database beginning in 1997. The turtle data were reported as total catch for each species.

Hydrology

During 1991-92, water surface elevations at Peoria Lake gage station were used as an index of water depths to determine if the Peoria Lake HREP sites could be sampled. The Peoria Lake gage station proved to be an unreliable indicator of water level conditions at the HREP sites. In late 1992 and 1997 sampling, water surface elevations from the Henry gage station were used to predict sampling accessibility at the HREP sites (Figures 4). For this report, the Henry gage will be used for all years. In general, if water levels fell below 441 feet above mean sea level at the Henry gage access to sampling sites was limited. In addition to water surface elevation, other measurements such as water temperature, dissolved oxygen, specific conductance, secchi disk transparency, and water velocity were taken at the fixed sites. All measurements were taken using LTRMP protocols (Gutreuter et. al.,1995).

All data collected was recorded on LTRMP fish collection and measurement sheets. These data

sheets were proofed and submitted to a contractor for data entry. The entered data were returned via the Upper Midwest Environmental Sciences Center (UMESC), USGS, Onalaska, WI. The data were then line by line verified between the original datasheets and an R:base application designed at the UMESC.

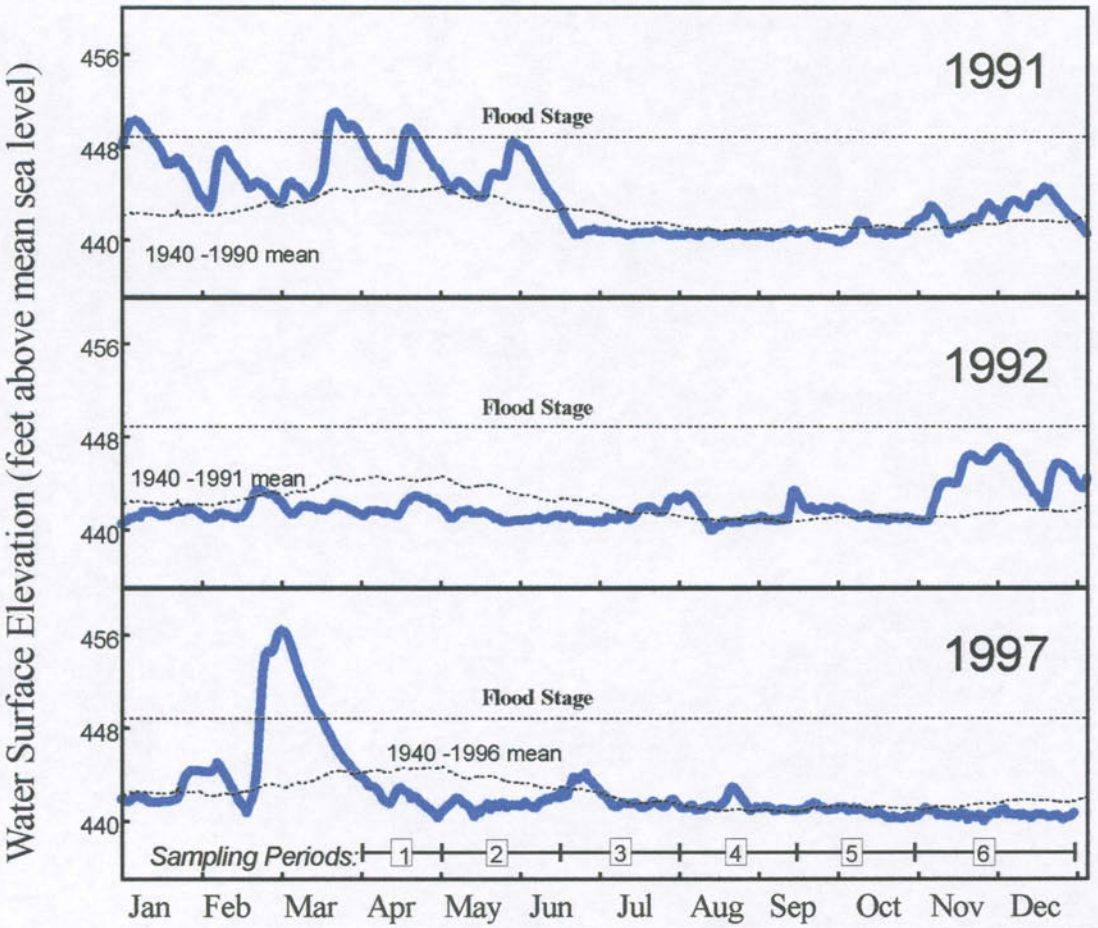
Data in this report are summarized several ways. First, we will present a summary of total fish collected at each site during 1997 HREP bioresponse monitoring, including number of species present (species richness) and most abundant species for each site (relative abundance). Second, comparisons will be made using catch data grouped by years, first as post-construction and then pre-construction, with 1991 and 1992 data combined as pre-construction data as well as having data from individual years. Third, data will be presented for comparisons of experimental sites and catches both post- and pre- construction. Fourth, comparisons of post- and pre-construction data from the control sites will be presented. Basic comparisons within these groups will consist of total fish abundance, species richness, and most abundant species information. Nomenclature for fishes follows Robins et al. (1991).

Results and Discussion

Hydrology

In 1997, water surface elevations at the HREP sites were low and stable throughout the year with only a

Figure 4. Water surface elevations at Henry, IL. as reported by the USACOE.



few exceptions. During late February and March the water levels were above flood stage, peaking approximately 6 feet over flood stage. During much of April and May water levels remained below the 52 year mean (Figure 4).
The water surface elevations in 1991 were high and unstable in sampling periods one and two before falling below the 50 year mean and remaining relatively stable through period three, four, and five. Water levels rose slightly above the mean during period six (Figure 4).

In 1992, water surface elevations remained below the long-term mean for most of the year. Low and stable levels remained prevalent through the first five time periods with levels rising above the mean in period six (Figure 4).

Although water levels in 1997 at Peoria Lake HREP were low, 299 of 320 (93%) scheduled sampling events were completed (Figure 4). The majority of the incomplete samples during 1997 were from the Peoria Lake and Babbs Slough shoreline sites. This was due to the low gradient between open water and shoreline which made boat accessibility very difficult during low water.

1997 Catch Summaries by Site

In 1997, the upper East River site (1) yielded 9,923 fish consisting of 50 species from all gears combined (Table 2). Emerald shiners (*Notropis atherinoides,* 76%, 7,584) were most abundant followed by gizzard shad (*Dorosoma cepediamum,* 5%, 541) and white bass (*Morone chrysops,* 3%, 263). This site accounted for the highest fish count and species diversity of any site and the most centrarchids at any site (4%, 368). We collected striped shiner (*Luxilis chrysocephalus*) for the first time during HREP or LTRMP La Grange Reach fish sampling at this site. Eight species were unique to this site in 1997: bowfin (*Amia calva*), striped shiner, river shiner (*Notropis blennius*), suckermouth minnow (*Phenacobius mirabilis*), flathead catfish (*Pylodictis olivaris*), warmouth (*Lepomis gulosus*), mud darter (*Etheostoma asprigene*), and slenderhead darter (*Percina phoxocephala*).

At the middle East River site (2) we collected 4,303 fish consisting of 44 species and two hybrids in 1997 (Table 2). Emerald shiners (45%, 1,940) were most abundant followed by gizzard shad (12%, 516) and common carp (*Cyprinis carpio,* 10%, 426). Blacknose dace (*Rhinichthys atratulus*) and brook stickleback (*Culaea inconstans*) were both collected here and at the Island site for the first time, one each per site. This is the only site during this HREP monitoring where mooneye (*Hiodon tergisus*) has been collected.

At the lower East River site (3) we collected 3,070 fish consisting of 33 species and two hybrids (Table 2). Emerald shiner (33%, 1010) were most abundant followed by common carp (21%, 644) and gizzard shad (15%, 456). There were no unique species collected here.

The Island site (4) yielded 6,269 fish consisting of 39 species and one hybrid (Table 2). Emerald shiners (44%, 2,776) were most abundant followed by gizzard shad (25%, 1,584) and common carp (10%, 617). There were no unique species except for the first-time collections of blacknose dace and brook stickleback shared with the middle East River site.

At the Peoria Lake open water site (5) we collected 588 fish consisting of 16 species (Table 2). Gizzard shad (49%, 288) were most abundant followed by smallmouth buffalo (*Ictiobus bubalus,* 13%, 74) and freshwater drum (*Aplodinotus grunniens,* 7%, 41).

At the Peoria Lake shoreline site (6) we collected 3,686 fish consisting of 23 species (Table 2). Emerald shiners (71%, 2,619) were most abundant followed by gizzard shad (14%, 519) and river

Table 2. Numbers of fish collected by all gear types from all sites (experimental and control) at HREP bioresponse monitoring sites at Upper Peoria Lake during 1997.

		Experimental Sites								Control Sites				All Sites
Common Name	*Scientific Name*	Island	East River			Peoria Lake	Chillicothe Is.	Peoria Lake	Experimental	Babbs Is.	Babbs Slough	Babbs Slough	Control	
		(New)	Lower	Middle	Upper	open water	main channel border	shoreline	Sites	main channel border	shoreline	open water	Sites	
Longnose gar	*Lepisosteus osseus*									2			2	2
Spotted gar	*Lepisosteus oculatus*													
Shortnose gar	*Lepisosteus platostomus*	7	19	10	10	31	13	51	141	16	71	5	92	233
American eel	*Anguilla rostrata*													
Bowfin	*Amia calva*				4				4					4
Gizzard shad	*Dorosoma cepedianum*	1,584	456	516	541	290	3,567	519	7,473	1,508	187	742	2,437	9,910
Threadfin shad	*Dorosoma petenese*	1	2	4	3		3,524		3,534					3,534
Skipjack herring	*Alosa chrysochloris*	4	14	13	15	8	11	1	66	30	1	21	52	118
Goldeye	*Hiodon alosoides*	1	1		2	23			27			17	17	44
Mooneye	*Hiodon tergisus*			1					1					1
Central stoneroller	*Compostoma anomalum*			2	2		1		5					5
Grass carp	*Ctenopharyngodon idella*	2	2		2				6	1	1		2	8
Red shiner	*Cyprinella lutrensis*	1		38	29		6		74	4			4	78
Common carp	*Cyprinus carpio*	617	644	426	164	34	348	13	2,246	247	17	79	343	2,589
Goldfish	*Carassius auratus*			1	2		1		4					4
Carp x goldfish	*Cyprinus carpio x auratus*	1	3	4					8					8
Silver chub	*Macrhybobsis storeriana*	7	2	17	22		33		81	3			3	84
Golden shiner	*Notemigonus crysoleucas*			1	5		1	1	8					8
Emerald shiner	*Notropis atherinoides*	2,776	1,010	1,940	7,584		998	2,619	16,927	447	3		450	17,377
Striped Shiner	*Luxilus chrysocephalus*				1				1					1
River shiner	*Notropis blennius*				6				6					6
Spottail shiner	*Notropis hudsonius*	42	69	62	196		138	2	509	48			48	557
Silverband shiner	*Notropis shumardi*	44	12	9	7			2	74	3			3	77
Sand shiner	*Notropis stramineus*	6		11	15		11	0	43	5			5	48
Suckermouth minnow	*Phenacobius mirabilis*				1				1					1
Bluntnose minnow	*Pimephales notatus*	13	4	12	39		16	1	85					85
Bullhead minnow	*Pimephales vigilax*	74	22	199	185		62	4	546	13			13	559
Blacknose dace	*Rhinichthys atratulus*	1		1					2					2
Creek chub	*Semotilus atromaculatus*	5		3			1		9					9
River carpsucker	*Carpiodes carpio*	99	22	57	77	31	65	213	564	30	16	16	62	626
Quillback	*Carpiodes cyprinus*	1		2	1	2	13		19					19
Highfin carpsucker	*Carpiodes velifer*	1		1			2		4		1	1	2	6
White sucker	*Catostomus commertoni*													
Northern hogsucker	*Hypentelium nigricans*						4		4					4
Smallmouth buffalo	*Ictiobus cyprinellus*	288	151	263	139	74	328	6	1,249	498	21	74	593	1,842
Bigmouth buffalo	*Ictiobus cyprinellus*	4		3	2	5		5	19		1	8	9	28
Black buffalo	*Ictiobus niger*	3	3	3			5		14	15	1	11	27	41
Unidentified buffalo	*Ictiobus sp.*	35	1	10	9		9	68	132	12			12	144
Silver redhorse	*Moxostoma anisurum*						1		1					1
Golden redhorse	*Moxostoma erythrurum*			2	4				6					6
Shorthead redhorse	*Moxostoma macrolepidotum*	4	11	16	19	3	2	3	58	2	5	4	11	69
Black bullhead	*Ameiurus melas*				3	1			4	1	2	2	5	9
Yellow bullhead	*Ameiurus natalis*		1	1	3				5	1	1		2	7
Brown bullhead	*Ameiurus nebulosus*	9	1	3	3	1			17			6	6	23
Channel catfish	*Ictalurus punctatus*	33	32	92	31	6	115		309	139		7	146	455
Stonecat	*Noturus flavus*													
Tadpole madtom	*Noturus gyrinus*													
Flathead catfish	*Pylodictis olivaris*				3				3					3
Western mosquitofish	*Gambusia affinis*				2				2	1			1	3
Brook stickleback	*Culaea inconstans*	1		1					2					2
White perch	*Morone americana*	1	1		2				4					4
White bass	*Morone chysops*	245	187	226	263	26	68	101	1,116	94	74	18	186	1,302
Yellow bass	*Morone mississippiensis*	3	1	5	3				12	1	1	2	4	16
Green sunfish	*Lepomis cyanellus*		1	3	13		3		20					20
Pumpkinseed	*Lepomis gibbosus*													
Warmouth	*Lepomis gulosus*				1				1					1
Orangespotted sunfish	*Lepomis humilis*		1	1	5				7					7
Bluegill	*Lepomis macrochirus*	21	61	137	200		5	39	463	4	2		6	469
Green sunfish x bluegill	*L. cyanellus x macrochirus*		1	1					2					2
Smallmouth bass	*Micropterus dolomieui*	2		2	2		0	3	9					9
Largemouth bass	*Micropterus salmoides*	1	13	15	52		5	2	88	1			1	89
White crappie	*Pomoxis annularis*	7	6	12	17		1		43	3	2		5	48
Black crappie	*Pomoxis nigromaculatus*	29	17	45	78		3	19	191		2		2	193
Mud darter	*Etheostoma asprigene*				1				1					1
Logperch	*Percina caprodes*	1	13	26	32		1	1	74	1			1	75
Slenderhead darter	*Percina phoxocephala*				1				1					1
Sauger	*Stizostedion canadense*	17	19	13	40	12	9	5	115	8	1	22	31	146
Walleye	*Stizostedion vitreum*	1	2	1					4					4
Freshwater drum	*Aplodinotus grunniens*	277	265	84	82	41	62	8	819	44	6	27	77	896
Unidentified	*Unidentified unidentified*			8					8					8
TOTAL		6,269	3,070	4,303	9,923	588	9,432	3,686	37,271	3,182	416	1,062	4,660	41,931
Total number of species collected		39	33	44	50	16	35	23	59	29	21	18	34	60
Total number of hybrids collected		1	2	2	0	0	0	0	2	0	0	0	0	2

carpsucker (*Carpiodes carpio,* 6%, 213). There were no unique species collected here.

The Chillicothe Island main channel border site (7) yielded 9,432 fish consisting of 35 species (Table 2). Gizzard shad (38%, 3567) and threadfin shad (*Dorosoma petenense,* 37%, 3524) were most abundant followed by emerald shiner (11%, 998). Northern hogsucker (*Hypentelium nigricans*) and silver redhorse (*Moxostoma anisurum*) were collected for the first time and were unique to this site.

At the Babbs Island main channel border site (8) we collected 3,182 fish consisting of 29 species (Table 2). Gizzard shad (47%, 1508) were most abundant followed by smallmouth buffalo (16%, 498) and emerald shiner (14%, 447). Longnose gar (*Lepisosteus osseus*) was only collected at this site in 1997.

At the Babbs Slough shoreline site (9) we collected 416 fish consisting of 21 species (Table 2). Gizzard shad (45%, 187) were most abundant followed by white bass (18%, 74) and shortnose gar (*Lepisosteus platostomus,* 17%, 71). There were no unique species collected here.

At the Babbs Slough open water site (10) we collected 1,062 fish consisting of 18 species (Table 2). Gizzard shad (70%, 742) were most abundant followed by common carp (7%, 79) and smallmouth buffalo (7%, 74). There were no unique species collected here.

Post-construction and Pre-construction annual summaries

Post-construction

During 1997, a total of 41,931 fish from 60 species and 2 hybrids was collected from all sites (Table 3). Of these, 41 % (17,377) were emerald shiner, while gizzard shad (24%, 9,910) and threadfin shad (8%, 3,534) followed in total abundance.

Pre-construction

During pre-construction sampling (1991-92), a total of 43,734 fish were collected (Table 3). Of these, 52% (22,811) were emerald shiner, while gizzard shad (16%, 7,150) and common carp (8%, 3,331) followed in total abundance. A total of 50 species and 2 hybrids was collected during pre-construction sampling.

During 1991, 7,473 fish consisting of 39 species and 1 hybrid were collected (Table 3). Gizzard shad (20%, 1,519) and bluegill (*Lepomis macrochirus,* 16%, 1,172) dominated the catch with common carp (13%, 1,007) third in abundance.

In 1992, 36,261 fish consisting of 49 species and 2 hybrids were collected (Table 3). Of these, 63% (22,688 fish) were emerald shiner followed by gizzard shad (16%, 5,631) and common carp (6%, 2,324).

Post-construction vs Pre-construction

From all years, 1997 and 1991-92 combined, we collected a total of 85,665 fish consisting of 66 species and 2 hybrids during HREP monitoring at Peoria Lake (Table 3). The total numbers of species we collected during post-construction sampling (1997; 60 and 2 hybrids), and preconstruction sampling (1991-92 combined; 50 and 2 hybrids), are higher than the 39 species expected from data collected over the 5 years prior to this study by the Illinois Department of Conservation (now Illinois Department of Natural Resources [IDNR]; USACOE, 1990). Although methods weren't disclosed for the IDNR historical data, the HREP sampling is likely more intensive, over a longer time, and with a wider variety of gears and habitats.

Table 3. Total numbers of fish collected post-construction (1997) and pre-construction (1991-92) by all gear types from all sites (experimental and control) at HREP bioresponse monitoring sites at Upper Peoria Lake during three years of monitoring (1991, 1992, and 1997).

Common Name	*Scientific Name*	1991	1992	Sub Total (1991-92)	1997	Grand Total 1991-92, 1997
Longnose gar	*Lepisosteus osseus*		2	2	2	4
Spotted gar	*Lepisosteus oculatus*		1	1		1
Shortnose gar	*Lepisosteus platostomus*	36	200	236	233	469
American eel	*Anguilla rostrata*		1	1		1
Bowfin	*Amia calva*		1	1	4	5
Gizzard shad	*Dorosoma cepedianum*	1,519	5,631	7,150	9,910	17,060
Threadfin shad	*Dorosoma petenese*	259	236	495	3,534	4,029
Skipjack herring	*Alosa chrysochloris*	29	175	204	118	322
Goldeye	*Hiodon alosoides*		8	8	44	52
Mooneye	*Hiodon tergisus*				1	1
Central stoneroller	*Compostoma anomalum*				5	5
Grass carp	*Ctenopharyngodon idella*				8	8
Red shiner	*Cyprinella lutrensis*		11	11	78	89
Common carp	*Cyprinus carpio*	1,007	2,324	3,331	2,589	5,920
Goldfish	*Carassius auratus*	3	48	51	4	55
Carp x goldfish	*Cyprinus carpio x auratus*	15	13	28	8	36
Silver chub	*Macrhybobsis storeriana*	36	35	71	84	155
Golden shiner	*Notemigonus crysoleucas*				8	8
Emerald shiner	*Notropis atherinoides*	123	22,688	22,811	17,377	40,188
Striped Shiner	*Luxilus chrysocephalus*				1	1
River shiner	*Notropis blennius*				6	6
Spottail shiner	*Notropis hudsonius*	100	350	450	557	1,007
Silverband shiner	*Notropis shumardi*	1	245	246	77	323
Sand shiner	*Notropis stramineus*				48	48
Suckermouth minnow	*Phenacobius mirabilis*				1	1
Bluntnose minnow	*Pimephales notatus*		2	2	85	87
Bullhead minnow	*Pimephales vigilax*	4	85	89	559	648
Blacknose dace	*Rhinichthys atratulus*				2	2
Creek chub	*Semotilus atromaculatus*				9	9
River carpsucker	*Carpiodes carpio*	254	410	664	626	1,290
Quillback	*Carpiodes cyprinus*	114	26	140	19	159
Highfin carpsucker	*Carpiodes velifer*		10	10	6	16
White sucker	*Catostomus commersoni*	2	3	5		5
Northern hogsucker	*Hypentelium nigricans*				4	4
Smallmouth buffalo	*Ictiobus cyprinellus*	357	451	808	1,842	2,650
Bigmouth buffalo	*Ictiobus cyprinellus*	3	52	55	28	83
Black buffalo	*Ictiobus niger*	7	19	26	41	67
Unidentified buffalo	*Ictiobus sp.*				144	144
Silver redhorse	*Moxostoma anisurum*				1	1
Golden redhorse	*Moxostoma erythrurum*	1	2	3	6	9
Shorthead redhorse	*Moxostoma macrolepidotum*	11	63	74	69	143
Black bullhead	*Ameiurus melas*	6	16	22	9	31
Yellow bullhead	*Ameiurus natalis*	2	6	8	7	15
Brown bullhead	*Ameiurus nebulosus*	624	112	736	23	759
Channel catfish	*Ictalurus punctatus*	108	741	849	455	1,304
Stonecat	*Noturus flavus*		1	1		1
Tadpole madtom	*Noturus gyrinus*	2	6	8		8
Flathead catfish	*Pylodictis olivaris*	1	5	6	3	9
Western mosquitofish	*Gambusia affinis*		5	5	3	8
Brook stickleback	*Culaea inconstans*				2	2
White perch	*Morone americana*	1	13	14	4	18
White bass	*Morone chysops*	320	888	1,208	1,302	2,510
Yellow bass	*Morone mississippiensis*	9	5	14	16	30
Green sunfish	*Lepomis cyanellus*	87	21	108	20	128
Pumpkinseed	*Lepomis gibbosus*	1		1		1
Warmouth	*Lepomis gulosus*		1	1	1	2
Orangespotted sunfish	*Lepomis humilis*	14	10	24	7	31
Bluegill	*Lepomis macrochirus*	1,172	572	1,744	469	2,213
Green sunfish x bluegill	*L. cyanellus x macrochirus*		4	4	2	6
Smallmouth bass	*Micropterus dolomieui*				9	9
Largemouth bass	*Micropterus salmoides*	104	77	181	89	270
White crappie	*Pomoxis annularis*	90	35	125	48	173
Black crappie	*Pomoxis nigromaculatus*	86	90	176	193	369
Mud darter	*Etheostoma asprigene*				1	1
Logperch	*Percina caprodes*	6	20	26	75	101
Slenderhead darter	*Percina phoxocephala*				1	1
Sauger	*Stizostedion canadense*	54	21	75	146	221
Walleye	*Stizostedion vitreum*	1	1	2	4	6
Freshwater drum	*Aplodinotus grunniens*	904	519	1,423	896	2,319
Unidentified	*Unidentified unidentified*				8	8
TOTAL		7,473	36,261	43,734	41,931	85,665
Total number of species collected		39	49	50	60	66
Total number of hybrids collected		1	2	2	2	2

Unique species caught in 1997 from all sites combined included: mooneye, central stoneroller (*Campostoma anomalum*), grass carp (*Ctenopharyngodon idella*), striped shiner, golden shiner (*Notemigonus crysoleucas*), river shiner, sand shiner (*Notropis stramineus*), suckermouth minnow, blacknose dace, creek chub (*Semotilus atromaculatus*), northern hogsucker, silver redhorse, brook stickleback, smallmouth bass (*Micropterus dolomieui*), mud darter, and slenderhead darter. Pumpkinseed (*Lepomis gibbosus*) was only caught in 1991. Spotted gar (*Lepisosteus oculatus*), american eel (*Anguilla rostrata*), and stonecat (*Noturus flavus*) were only caught in 1992.

Experimental Sites

Post-construction

The experimental sites yielded 64 species and 2 hybrids (63,871 fish) for all years combined (Table 4). Eighty-nine percent (37,271) of the total fish collected in 1997 (41,931) were caught at these experimental sites. Emerald shiners composed 45% (16,927) of the catch from the experimental sites, while gizzard shad and threadfin shad constituted 20% (7,473) and 9% (3,534) of the catch respectively.

Pre-construction

Sixty-one percent (26,600) of the total fish collected in 1991-1992 (43,734) were from the experimental sites (Table 4). Emerald shiners were most abundant from the experimental sites with 53% (13,981) of the total catch, of these 99% (13,900) were from 1992. Gizzard shad (11%, 2,881) and common carp (9%, 2,478) followed as the next most common species caught from the experimental sites during 1991 and 1992 combined.

In 1991, the experimental sites accounted for 5,411 fish (Table 4). Gizzard shad (22%, 1,212), bluegill (21%, 1,159), and common carp (16%, 843) dominated the catches.

In 1992, 21,189 fish were collected from the experimental sites (Table 4). This catch was dominated by emerald shiner (66%, 13,900), gizzard shad (8%, 1,669), and common carp (8%, 1,635).

Post-construction vs Pre-construction

Within the experimental sites, seventeen species were collected during 1997 that we had not collected during our pre-construction sampling in 1991-92. They were mooneye, central stoneroller, grass carp, golden shiner, striped shiner, river shiner, sand shiner, suckermouth minnow, blacknose dace, creek chub, northern hogsucker, silver redhorse, western mosquitofish (*Gambusia affinis*), brook stickleback, smallmouth bass, mud darter, and slenderhead darter. Only four species collected in 1991 or 1992 at the experimental sites were not collected in 1997, they were spotted gar, american eel, white sucker (*Catostomus commersoni*), and pumpkinseed (Table 5).

Control Sites

Post-construction

From the control sites for all years combined, a total of 43 species and 1 hybrid (21,794 fish) were collected (Table 4). The catch at the control sites in 1997 show gizzard shad (52%, 2,437) being the most numerous. Smallmouth buffalo (12%, 593) and emerald shiner (10%, 450) were the second and third most abundant at the control sites.

Pre-construction

A total of 17,134 fish was collected from the control sites during pre-construction sampling consisting mostly of emerald shiner (52%, 8,830), gizzard shad (25%, 4,269), and common carp (5%, 853; Table 4).

Table 4. Total numbers of fish collected at experimental and control sites by all gear types at HREP bioresponse monitoring sites at Upper Peoria Lake during three years of monitoring (1991,1992, and 1997).

		Experimental Sites				Control Sites				
Common Name	***Scientific Name***	1991 Total	1992 Total	1997 Total	**Sub Total experimental**	1991 Total	1992 Total	1997 Total	**Sub Total control**	**Grand Grand Total**
Longnose gar	*Lepisosteus osseus*		1		1		1	2	3	4
Spotted gar	*Lepisosteus oculatus*		1		1					1
Shortnose gar	*Lepisosteus platostomus*	36	147	141	324		53	92	145	469
American eel	*Anguilla rostrata*		1		1					1
Bowfin	*Amia calva*		1	4	5					5
Gizzard shad	*Dorosoma cepedianum*	1,212	1,669	7,473	10,354	307	3,962	2,437	6,706	17,060
Threadfin shad	*Dorosoma petenese*	198	38	3,534	3,770	61	198		259	4,029
Skipjack herring	*Alosa chrysochloris*	20	91	66	177	9	84	52	145	322
Goldeye	*Hiodon alosoides*		6	27	33		2	17	19	52
Mooneye	*Hiodon tergisus*			1	1					1
Central stoneroller	*Compostoma anomalum*			5	5					5
Grass carp	*Ctenopharyngodon idella*			6	6			2	2	8
Red shiner	*Cyprinella lutrensis*		11	74	85			4	4	89
Common carp	*Cyprinus carpio*	843	1,635	2,246	4,724	164	689	343	1,196	5,920
Goldfish	*Carassius auratus*	3	46	4	53		2		2	55
Carp x goldfish	*Cyprinus carpio x auratus*	5	6	8	19	10	7		17	36
Silver chub	*Macrhybobsis storeriana*	23	32	81	136	13	3	3	19	155
Golden shiner	*Notemigonus crysoleucas*			8	8					8
Emerald shiner	*Notropis atherinoides*	81	13,900	16,927	30,908	42	8,788	450	9,280	40,188
Striped shiner	*Luxilus chrysocephalus*			1	1					1
River shiner	*Notropis blennius*			6	6					6
Spottail shiner	*Notropis hudsonius*	88	338	509	935	12	12	48	72	1,007
Silverband shiner	*Notropis shumardi*	1	245	74	320			3	3	323
Sand shiner	*Notropis stramineus*			43	43			5	5	48
Suckermouth minnow	*Phenacobius mirabilis*			1	1					1
Bluntnose minnow	*Pimephales notatus*		2	85	87					87
Bullhead minnow	*Pimephales vigilax*	4	84	546	634		1	13	14	648
Blacknose dace	*Rhinichthys atratulus*			2	2					2
Creek chub	*Semotilus atromaculatus*			9	9					9
River carpsucker	*Carpiodes carpio*	189	262	564	1,015	65	148	62	275	1,290
Quillback	*Carpiodes cyprinus*	75	14	19	108	39	12		51	159
Highfin carpsucker	*Carpiodes velifer*		4	4	8		6	2	8	16
White sucker	*Catostomus commersoni*	1	2		3	1	1		2	5
Northern hogsucker	*Hypentelium nigricans*			4	4					4
Smallmouth buffalo	*Ictiobus cyprinellus*	196	244	1,249	1,689	161	207	593	961	2,650
Bigmouth buffalo	*Ictiobus cyprinellus*	3	18	19	40		34	9	43	83
Black buffalo	*Ictiobus niger*	6	12	14	32	1	7	27	35	67
Unidentified buffalo	*Ictiobus sp.*			132	132			12	12	144
Silver redhorse	*Moxostoma anisurum*			1	1					1
Golden redhorse	*Moxostoma erythrurum*	1	2	6	9					9
Shorthead redhorse	*Moxostoma macrolepidotum*	9	50	58	117	2	13	11	26	143
Black bullhead	*Ameiurus melas*	2	7	4	13	4	9	5	18	31
Yellow bullhead	*Ameiurus natalis*	2	4	5	11		2	2	4	15
Brown bullhead	*Ameiurus nebulosus*	8	94	17	119	616	18	6	640	759
Channel catfish	*Ictalurus punctatus*	67	299	309	675	41	442	146	629	1,304
Stonecat	*Noturus flavus*						1		1	1
Tadpole madtom	*Noturus gyrinus*					2	6		8	8
Flathead catfish	*Pylodictis olivaris*		4	3	7	1	1		2	9
Western mosquitofish	*Gambusia affinis*			2	2		5	1	6	8
Brook stickleback	*Culaea inconstans*			2	2					2
White perch	*Morone americana*	1	13	4	18					18
White bass	*Morone chysops*	295	797	1,116	2,208	25	91	186	302	2,510
Yellow bass	*Morone mississippiensis*	8	3	12	23	1	2	4	7	30
Green sunfish	*Lepomis cyanellus*	85	21	20	126	2			2	128
Pumpkinseed	*Lepomis gibbosus*	1			1					1
Warmouth	*Lepomis gulosus*		1	1	2					2
Orangespotted sunfish	*Lepomis humilis*	14	10	7	31					31
Bluegill	*Lepomis macrochirus*	1,159	544	463	2,166	13	28	6	47	2,213
Green sunfish x bluegill	*L. cyanellus x macrochirus*		4	2	6					6
Smallmouth bass	*Micropterus dolomieui*			9	9					9
Largemouth bass	*Micropterus salmoides*	102	76	88	266	2	1	1	4	270
White crappie	*Pomoxis annularis*	89	32	43	164	1	3	5	9	173
Black crappie	*Pomoxis nigromaculatus*	86	88	191	365		2	2	4	369
Mud darter	*Etheostoma asprigene*			1	1					1
Logperch	*Percina caprodes*	4	20	74	98	2		1	3	101
Slenderhead darter	*Percina phoxocephala*			1	1					1
Sauger	*Stizostedion canadense*	32	15	115	162	22	6	31	59	221
Walleye	*Stizostedion vitreum*		1	4	5	1			1	6
Freshwater drum	*Aplodinotus grunniens*	462	294	819	1,575	442	225	77	744	2,319
Unidentified	*Unidentified unidentified*			8	8					8
TOTAL		5,411	21,189	37,271	63,871	2,062	15,072	4,660	21,794	85,665
Total number of species collected		36	46	59	64	28	36	34	43	66
Total number of hybrids collected		1	2	2	2	1	1	0	1	2

Table 5. Unique fish species from the Peoria Lake HREP experimental and control sites Chillicothe Island area.

Experimental Sites

Pre Project (1991 and 1992)		Post Project (1997)	
Unique species	*Individuals*	*Unique species*	*Individuals*
American eel	1	Slenderhead darter	1
Spotted gar	1	Suckermouth minnow	1
Pumpkinseed	1	Striped shiner	1
White sucker	5	Mud darter	1
		Silver redhorse	1
		Mooneye	1
		Western mosquitofish	2
		Brook stickleback	2
		Blacknose dace	2
		Northern hogsucker	4
		Central stoneroller	5
		River shiner	6
		Grass carp	6
		Golden shiner	8
		Smallmouth bass	9
		Creek chub	9
		Sand shiner	42
Total species + hybrids	47 + 2		59 + 2
Total number of fish	26,600		37,271
Pre and post project total species + hybrids		**64 + 2**	
Pre and post project total number of fish		**63,871**	

Control Sites

Pre Project (1991 and 1992)		Post Project (1997)	
Unique species	*Individuals*	*Unique species*	*Individuals*
Stonecat	1	Grass carp	2
Walleye	1	Silverband shiner	3
Goldfish	2	Red shiner	4
Green sunfish	2	Sand shiner	5
White sucker	2		
Flathead catfish	2		
Tadpole madtom	8		
Quillback	51		
Threadfin shad	259		
Total species + hybrids	39 + 1		34 + 0
Total number of fish	17,134		4,660
Pre and post project total species + hybrids		**43+1**	
Pre and post project total number of fish		**21,794**	

In 1991, 2,062 fish were collected from the control sites with brown bullhead (*Ictalurus nebulosus*, 30%, 616), freshwater drum (21%, 442), and gizzard shad (15%, 307) being most abundant (Table 4).

In 1992, 15,072 fish were collected from the control sites (Table 4). Of these, emerald shiner (58%, 8,788), gizzard shad (26%, 3,962), and common carp (5%, 689) were most abundant.

Post-construction vs Pre-construction

From within the control sites, four species were unique in 1997. They were grass carp, red shiner (*Cyprinella lutrensis*), silverband shiner (*Notropis shumardi*), and sand shiner. Nine species were caught only during 1991 or 1992 from the control sites, they were threadfin shad, goldfish (*Carassius auratus*), quillback (*Carpiodes cyprinus*), white sucker, stonecat, tadpole madtom (*Noturus gyrinus*), flathead catfish, green sunfish (*Lepomis cyanellus*), and walleye (*Stizostedeon vitreum*; Tables 5).

Experimental Sites vs Control Sites

Being that there are more experimental sites in more varying habitats than control sites it is not surprising that there are more taxa (64 species and 2 hybrids) present at the experimental sites than the control sites (43 species and 1 hybrid; Table 4). Abundance of the top three species within the two groups of sites (experimental and control) however followed the same pattern with emerald shiner, gizzard shad, and common carp being first, second, and third in both experimental and control sites.

Turtles

During 1997 we collected data from turtles taken as incidental catch in our fish nets. Twenty-eight turtles were collected consisting of five taxa. Species caught were redear slider (*Trachemys scripta*), spiny softshell (*Trionyx spinifer*), western painted turtle (*Chrysemys picta*), common snapping turtle (*Chelydra serpentina*), and common map turtle (*Graptemys geographica*).

Executive Summary and Notes

Planned construction at the HREP site was completed by 1997, with additional revetment being added during 1997 to modify the flow of water through the East River and Island site by the USACOE.

During 1997, sampling sites were established in the new habitats created by construction.

In general, water levels have been low and somewhat stable throughout the three years of HREP bioresponse monitoring.

A total of 299 of 320 or 93% of all scheduled sampling was completed in 1997.

A total of 41,931 fish, consisting of 60 species and 2 hybrids, was collected in 1997. Prior to construction (1991-92) 43,734 fish were collected consisting of 50 species and 2 hybrids.

A total of 85,665 fish has been collected in 1991, 1992, and 1997 consisting of 66 species and two hybrids. Forty-seven percent or 40,188 of these fish were emerald shiner.

There were no state or federally threatened or endangered species collected.

Five species of turtles were identified within the experimental and control areas in 1997.

Gill nets were added to the gears used at the Island site in 1998 to compare this one-time open water habitat to that of the Peoria Lake open water site

which was only sampled with gill nets.

Additional post-construction sampling was completed in 1998 and data analysis is underway.

A comprehensive report comparing all years will be completed using two pre-construction and two post-construction years of data.

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Literature cited

Harvey, James R. 1992. Midterm Report on Pre-construction Sampling at Chautauqua and Peoria Lake HREP areas. Prepared for the U.S. Army Corps of Engineers, Rock Island District. 48 p.

Irons, K. S. and K. Douglas Blodgett. 1993. Annual progress report for bioresponse monitoring of Habitat Rehabilitation and Enhancement Projects (HREPs) for Peoria Lake and Lake Chautauqua, May 1993. Prepared for the U.S. Army Corps of Engineers, Rock Island District. 45 p.

Blodgett, K. Douglas, Irons, K. S., and T. R. Cook. 1994. Progress Report: Bioresponse Monitoring at Peoria Lake and Lake Chautauqua Habitat Rehabilitation and Enhancement Projects, August 1994. Prepared for the U.S. Army Corps of Engineers, Rock Island District. 659 p.

Department of the Army, Rock Island District, Corp. of Engineers. July 1990. Upper Mississippi River System Environmental management Program Definite Project Report with integrated Environmental Assessment (R-6F). Peoria Lake Enhancement Peoria Pool, Illinois Waterway, River miles 178.5 to 181.0. State of Illinois.

Lubinski, K.S. and J. L. Rasmussen. 1988. Procedures Manual (Revision 1.1) of the Long Term Resource Monitoring Program for the Upper Mississippi River System. U.S. Fish and Wildlife Service, Environmental Management Technical Center, La Crosse, Wisconsin.

Gutreuter, S., R. Burkhardt, and K. Lubinski. 1995. Long Term Resource Monitoring Program Procedures: Fish Monitoring. National Biological Service, Environmental Management Technical Center, Onalaska, Wisconsin, July 1995. LTRMP 95-P002-1. 42 pp. + Appendixes A-J (with Addendum 20 June 1997).

Robins, C. R., C. E. Bond, J. R. Brooker, E. A. Lachner, R. N. Lea, and W. B. Scott. 1991. Common and scientific names of fishes from the United States and Canada. 5th edition. Special Publication 20. American Fisheries Society, Bethesda, Maryland. 183 pp.